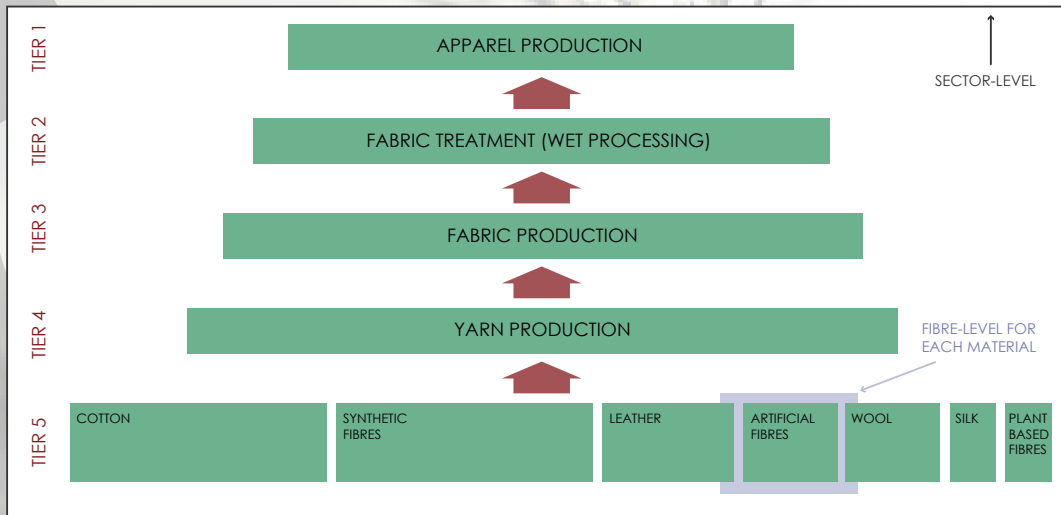


Natural capital accounting in the Danish apparel sector

The natural capital dependency of the Danish apparel sector is DKK3,390 million, equivalent to 11.7% of its total revenue. This sum is at risk should the apparel sector have to pay for its impacts as a result of environmental regulation, consumer demand and competition.

FIGURE 1: SCOPE OF NATURAL CAPITAL ACCOUNT ANALYSIS



THE FIGURE IS FOR ILLUSTRATIVE PURPOSES ONLY AND NOT TO SCALE

The figure provides an overview of the processes included within the analysis. The sector-level natural capital account captures all impacts associated with these five tiers, in the production of 65,000t of apparel for consumption in Denmark.

The analysis considers impacts associated with apparel from raw material production through to final product, and captures the following indicators:

- Water consumption
- GHG emissions
- Indirect land use change
- Water pollution
- Air pollution

Use and disposal of apparel is not considered within the analysis. Future research may be strengthened by expanding the scope to include these stages, and potentially additional indicators such as waste, land pollution and ecosystem services to provide a more holistic understanding of the full life impacts of a garment.

The Danish apparel sector is known for its engagement in becoming more sustainable, with the world's largest sustainable fashion summit held every year in its capital, Copenhagen. The sector has significant economic importance for Denmark with several global firms such as the IC Group, which owns brands such as Tiger of Sweden, Malene Birger and Peak Performance based there. As with most

European apparel, the majority of Denmark's clothing is imported, with more environmentally damaging activities conducted in countries which typically have cheaper labour and less stringent regulations. Supply chains comprise complicated networks of individual operators, from cotton farmers and wool producers, to large chemicals manufacturers and dyehouses.

To assess the environmental impacts of the apparel sector, the Danish Environmental Protection Agency (EPA) commissioned a triple-level natural capital account. This evaluates the natural capital impacts of the sector, a company (IC Group) and individual fibres.

By using monetary valuation, natural capital accounting allows stakeholders to identify the most significant environmental impacts across the supply chain of apparel consumed within Denmark. The research was conducted using input-output modelling and secondary data gathered from life cycle assessment databases and academic papers. Impacts were quantified and valued at each level of the supply chain based upon five key industries: raw material production, yarn spinning, fabric manufacturing, wet processing and the tailoring of apparel.

Sector-level findings

Over 80% of Danish apparel was imported as finished product in 2000. The total natural capital impact of all apparel consumption in Denmark equates to over DKK3.3 billion, distributed across numerous countries due to the global nature of the supply chain. The three largest import countries, China, India and Turkey, were reviewed in greater detail, and impacts are displayed in the figure below.

Key findings include:

- Greenhouse gas (GHG) emissions are the most significant impact,

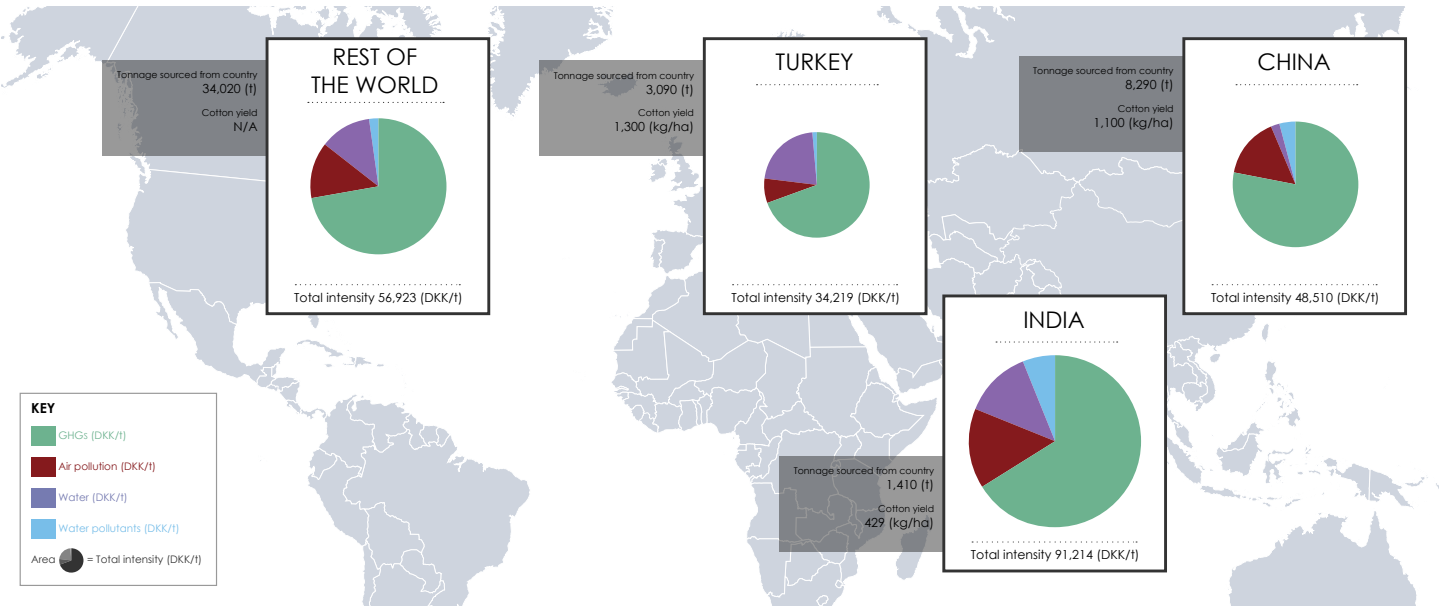
responsible for 71% of total impact of the sector.

- Raw material production (Tier 5) and final tailoring of apparel (Tier 1) are the most damaging stages of production.
- Tier 5 impacts are largely due to the water consumption of crops (particularly cotton), GHG emissions from energy use, and air and water pollution from agrochemicals.
- Tier 1 impacts are large, in part due to the inclusion of the total supply chain impacts of all adornments/trims at this stage.

What is natural capital accounting?

Natural capital accounting is a means of placing a monetary value on the environmental impacts along the entire value chain of an organization, sector, product or other entity. The account includes any industry activity that benefits the environment, as well as activities that adversely impact the environment. Almost all sectors will have a deficit on a natural capital account, reflecting the net cost to the environment. These costs are often not paid by the sector, but may become so as a result of regulation and other factors.

FIGURE 2: IMPACT INTENSITIES FOR ALL COUNTRIES OF IMPORT (ALL TIERS)



Company-level analysis: Natural capital account for the IC Group

IC Group produce 1,960 tonnes of apparel per year, with the majority comprising natural fibres, wool (26 %) and cotton (40 %). As with the apparel sector, impacts for the company are most significant in Tiers 1 and 5 and are dominated by GHG emissions.

Key findings include:

- Cotton is the largest input by weight, and cultivation is associated with 11% of total impacts.
- The harvesting of wool has the greatest natural capital impact for the IC Group (25% of total) largely due to GHG emissions from farming and more intensive cleaning requirements of the fibre.
- Synthetic and artificial fibres¹ are both associated with lower natural capital dependency, but GHG emissions can be significant and vary depending on source location.

TABLE 1: TOTAL IMPACTS ACROSS ALL TIERS AND INDICATORS OF IC GROUP

	Air pollution DKK million	GHG emissions DKK million	Water consumption DKK million	Water pollution DKK million	ILUC DKK million	Total DKK million
Tier 1 Tailoring of apparel	5.4	24.1	0.1	<0.1	0	30
Tier 2 Wet processing	3.6	19.6	0.2	0.1	0	23
Tier 3 Fabric manufacture	1.6	10.5	0.2	0.3	0	13
Tier 4 Yarn spinning	1.3	8.4	0.1	<0.1	0	10
Tier 5 Raw material production	4.2	28.7	9.4	4.5	2	49
Total	16	91	10	5	2	124

If including leather consumption, the total natural capital cost for the IC Group is DKK129 million.

To place these figures in context, the natural capital cost for a typical IC Group cotton t-shirt with mass of 210g would be DKK11.80.²

Fibre-level analysis

The natural capital impacts associated with different fibre types can vary significantly. The analysis at fibre-level considered raw material production, though did not take account of any processing into fabrics or treatment (captured in the sector-level analysis) or any of the use or end-of-use phases. This therefore does not consider fitness for purpose or longevity.

Key findings are given below:

- GHG emissions were the most significant impact for all fibres except cotton, for which the greatest impact was water consumption.
- Fibres from animal sources (namely silk and wool) were determined to have the greatest impact intensity per tonne of material due to additional cleaning stages required, as well as methane emissions of sheep.
- Variation over sourcing location can have a significant effect, with countries having varying levels of manufacturing efficiency, fuel sources for energy use, and water availability.
- Water scarcity is particularly important when considering cotton production, which has the most significant water footprint.
- Indian Better Cotton Initiative (BCI) cotton was found to have 10% natural capital savings compared to conventional cotton sourced from the same country.

1 Synthetic fibres are produced from synthesised polymers or small molecules and include fibres such as polyester, nylon, acrylic. Artificial fibres are also man-made, but may be produced from naturally occurring inputs, such as lyocell, viscose and cellulosic hybrid fibres.

2 Including all production stages to the point of finished product, but excluding consumer use and disposal at end-of-life.

Summary across the three levels of accounting

The triple-level analysis of apparel at sector, company and fibre level shows that material selection and sourcing location are critical to managing environmental impacts.

GHG emissions are the most important impact for the sector, dominating all tiers of production. These are largely associated with the use of agrochemicals in crop farming, methane releases from livestock, and energy generation using fossil fuels. Water is significant at the raw material phase, particularly in regions where water scarcity is high. Silk has the highest intensity impact per tonne, but due to low consumption (approximately 100 tonnes per year) silk is only responsible for 1% of the overall impact of the Danish sector. While cotton is less intensive, it is the largest mass of imported materials. As a result, it has 15% of the total sector-level impact which comes mainly from the farming phase of the supply chain. Switching to BCI-verified cotton offers significant opportunity for improvement.

BCI cotton is produced according to six principles, such as responsible management of water and agrochemical use, and with consideration of impacts to soil, workers and local ecosystems. Analysis of BCI and conventional cotton in India showed a 10% reduction in natural capital costs compared with conventional cotton from the same region.

Recommendations for the Danish apparel sector

Apparel supply chains are complex and extend across the globe. Raw materials are often extracted or produced in countries with less stringent environmental and labour regulations than Europe, meaning workers may also be more vulnerable to impacts. The sector has an annual natural capital cost of over DKK3.3 billion. Increasingly, these externalities are becoming costs to businesses through environmental legislation and taxes (along with other internalisation mechanisms), and this value would be a risk to the sectors profit should it not become better managed.

The triple-level analysis can be used by the apparel sector to understand the impacts of its supply chain throughout each phase of production and across different locations. To reduce its impacts, this research recommends that the sector should:

Improve transparency and data collection

- Allow 'hotspotting' of real impacts.
- Improve robustness of research.

Increase sourcing of sustainable fibres

- This could include BCI cotton, which is analysed within the research, but other improvement schemes and standards are likely to provide natural capital benefits if addressing issues

such as water consumption, soil management and chemical use.

Consider water scarcity of sourcing locations

- Where alternative not available, ensure targeting of these sources for supply chain engagement and sustainable procurement.

Supplier engagement

- Work with suppliers to reduce resource consumption and emissions. Tier 1 is a good starting point, as it is easiest to communicate directly with suppliers. Designers can also help to reduce impacts through selection of less complex decoration and adornment during this phase.

Find out more on natural capital accounting at:

<http://mst.dk/virksomhed-myndighed/groen-strategi/groennere-virksomhed/natural-capital-accounting/>

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